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Checking for Understanding: Formative Assessment Techniques for Your Classroom, 2nd Edition

by Douglas Fisher and Nancy Frey

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Chapter 1. Why Check for Understanding?

Checking for understanding permeates the teaching world. If you doubt that, consider the last lecture you heard. Whether the lecture was about chemical reactions, the great American novel, or the causes of World War II, the person speaking most likely checked for your understanding several times during the lecture by using such common prompts as "Any questions?", "Did you all get that?", "Everybody understand?", or "Does that make sense?"

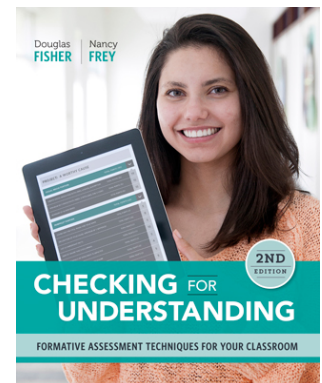
Rather than respond to these questions, most learners will sit quietly, and the lecturer doesn't know whether they understand, they are too confused to answer, they think they get it (but are off base), or they are too embarrassed to show their lack of understanding in front of others. Such general questions are simply not sufficient in determining whether or not students "get it."

Additionally, students aren't always self-regulated learners. They may not be aware of what they do or do not understand. They sometimes think they get it, when they really don't. If you doubt this, consider how often you have heard students comment, "I thought I knew this stuff, but I bombed the exam."

Much of the checking for understanding done in schools is ineffective. Thankfully, there are a number of ways to address the situation. We've organized this book, and the ways that teachers can check for understanding, into larger categories, including oral language, questioning, writing, projects and performances, tests, and schoolwide approaches. In this chapter, we'll explore checking for understanding in terms of what it is, what it is not, and how it links to other teaching initiatives.

What Is Checking for Understanding?

Checking for understanding is an important step in the teaching and learning process. The background knowledge that students bring into the classroom influences how they understand the material you share and the lessons or learning opportunities you provide. Unless you check for understanding, it is difficult to know exactly what students are getting out of the lesson. In fact, checking for understanding is part of a



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formative assessment system in which teachers identify learning goals, provide students feedback, and then plan instruction based on students' errors and misconceptions. Although the focus of this book is on strategies for checking for understanding, it is important to know how these strategies are used to improve student achievement as part of a more comprehensive system. Hattie and Timperley (2007) identified these phases as feed-up, feedback, and feed-forward. Note that checking for understanding is an important link between feed-up and the feedback students receive as well as the future lessons teachers plan.

Feed-up: Clarifying the purpose. The first component of a comprehensive formative assessment system involves an established purpose, objective, or learning target. When students understand the goal of the instruction, they are more likely to focus on the learning tasks at hand. When the goal "is clear, when high commitment is secured for it, and when belief in eventual success is high," student effort is amplified and achievement increases (Kluger & DeNisi, 1996, p. 260). Having a purpose isn't new, but it is critical to the implementation of a formative assessment system because when teachers have a clear purpose, they can align their checking for understanding strategies with their intended outcomes. For example, when an established purpose relates to comparing and contrasting characteristics of insects and arthropods, students know what to expect in the lesson and the teacher can plan instructional events such as shared readings, collaborative learning, and investigations to ensure that students focus their attention on this content. Similarly, when the established purpose is to persuade a reader using argumentation and facts, the students have a clear sense of what is expected and the teacher can plan instruction. In sum, a clear purpose is a critical component of an effective feedback system.

Feedback: Responding to student work. The second component of a comprehensive formative assessment system, and the one that is more commonly recognized, relates to the individual responses to their work that students receive from teachers. Of course, these responses should be directly related to the purpose and performance goal. The best feedback provides students with information about their progress or success and what course of action they can take to improve their understanding to meet the expected standard (Brookhart, 2008). Ideally, feedback occurs as students complete tasks so that they can continue to master content. If learning is the goal, teachers should not limit feedback to a summative review but should rather provide formative feedback that students could use to improve their performance. For example, in a unit of study on writing high-quality introductions, Kelly Johnson provided her students multiple opportunities to introduce topics using various techniques such as humor, questions, startling statistic, direct quotation, and so on. For each introduction they produced, Dr. Johnson provided feedback using a rubric so that students could revise their introduction and use that information on their next attempt. She did not simply note the mechanical errors students made but rather acknowledged areas of success and provided recommendations for students to focus on in their next drafts.

Feed-forward: Modifying instruction. The final component required for creating a formative assessment system involves using data to plan instruction. Feed-forward systems involve greater flexibility in lesson planning, because teachers can't simply follow a script or implement a series of lesson plans that are written in stone. This is the formative aspect of checking for understanding and one that is often missing. When teachers examine student work, whether it is from a daily checking for understanding task or a common formative assessment tool, they can use that information to plan instruction and intervention. For example, students in a 3rd grade class completed a collaborative poster in response to a word problem. One of the groups had a problem that read: *Six students are sitting at each table in the lunchroom. There are 23 tables. How many students are in the lunchroom?* The students in this class knew that they had to answer the question using words, numbers, and pictures. Not only did the students with this problem do it wrong, but nearly every group had the wrong answer. Given this information, the teacher knew that she needed to provide more modeling for her students about how to solve word problems. The feed-forward, in this case, required a whole-class reteaching. Alternatively, in a 5th grade classroom, the teacher noted that six students regularly capitalized random words in sentences. Mauricio, for example, had the words *fun*, *very*, *excited*, and *challenge* incorrectly capitalized in the first paragraph. Given that the rest of the class was not making this type of error, their teacher knew that feed-forward instruction with the whole class was not necessary.

Instead, he needed to provide additional guided instruction for the students who consistently made this type of error.

Know the Difference Between a Mistake and an Error

All of us make mistakes. If we're fortunate, we catch ourselves (or someone else does) and we do our best to correct it. Typically mistakes occur due to a lack of attention. But importantly, once pointed out, there is immediate recognition and usually knowledge of the corrective action to take. Our students do this as well. They make mistakes due to fatigue, carelessness, or inattention, and as a result their performance suffers. However, they possess the knowledge and can avoid the mistake in the future by increasing their attention. It's easy for us to recognize mistakes by knowing the student's previous work. A mistake strikes us as being uncharacteristic, usually because we have seen the student do similar work correctly in past. Mistakes can be huge, and we aren't minimizing them. NASA lost a \$125 million orbiter in 1999 because one engineering team used metric measures while another used English measures. That was a costly mistake, but it wasn't because the teams didn't know how to use the metric system. Had the mistake been caught in time, they would have known precisely how to correct it. Errors, on the other hand, occur because of a lack of knowledge. Even when alerted, the learner isn't quite sure what to do next. He lacks the skills or conceptual understanding to do anything differently when given another opportunity to try. Correcting mistakes while failing to address errors can be a costly waste of instructional time.

Errors fall into four broad categories and, when analyzed, can provide teachers with information they need to make instruction more precise. Some students make *factual errors* that interfere with their ability to perform with accuracy. Life sciences teacher Kenya Jackson sees this with her students who have difficulty correctly defining the differences and similarities between recessive and dominant traits. She also witnesses some of her students making *procedural errors* that make it difficult to apply factual information. "When I initially teach how to use a Punnett square to predict probability about genotype," she said, "they can tell me what dominate and recessive alleles are, but they can't calculate them in a meaningful way." A third type is a *transformation error*. Ms. Jackson notes that the Punnett square procedure is only valid when the traits are independent of one another. "Although I use examples and nonexamples in my teaching, some of them still overgeneralize the procedure and try to use it with polygenic traits such as hair color," she said. "For some, they have learned a tool and now they want to use it in every situation." A fourth type of error, the *misconception*, can result from the teaching itself. "I have to stay on guard for this," Ms. Jackson said. "Because I teach them Punnett squares, many of them hold this misconception that one gene is always responsible for one trait. These ideas can be stubbornly held, so I have to teach directly with misconceptions in mind."

An important part of the learning process is identifying and confronting misconceptions that can interfere with learning. Consider, for instance, how appreciating and addressing students' misconceptions can inform instruction in the following areas:

Incorrect beliefs of young children that paintings are produced in factories (Wolf, 1987)

Elementary students' misunderstanding that an equal sign in mathematics indicates an operation, rather than a relation (Ginsburg, 1982)

K-3 students' beliefs that Native Americans who lived in tepees did so because they were poor and could not afford a house (Brophy & Alleman, 2002)

Mistaken beliefs about living creatures—for example, that flies can walk on the ceiling because they have suction cups on their feet, and beavers use their tails as a trowel (Smith, 1920)

Science students' misconception that larger objects are heavier than smaller ones (Schauble, 1996)

The belief by adolescents (and adults) that there is a greater likelihood of "tails" in a coin toss after a series of "heads"—also known as the "Gambler's Fallacy" (Shaughnessy, 1977)

The act of checking for understanding not only identifies errors and misconceptions but also can improve learning. In a study by Vosniadou, Ioannides, Dimitrakopoulou, and Papademetriou (2001), two groups of students participated in a physics lesson. With one group of students, the researchers checked for understanding before moving on to the next part of the lesson. They did so by presenting students with a brief scenario and asking them to predict and explain the outcome. The other group participated in the exact same lesson, but without any pauses to check for understanding. As you might expect, the findings clearly demonstrated that the first group had a significantly greater increase in post-test over pre-test performance on assessments of content knowledge. In addition, short but frequent quizzes of newly learned information appear to increase students' retention and retrieval of information, including that which is related but not tested, and assists learners in better organizing information (Roediger, Putnam, & Smith, 2011).

Checking for understanding provides students with a model of good study skills. When their teachers regularly check for understanding, students become increasingly aware of how to monitor their own understanding. In the classic study by Bloom and Broder (1950), students performing well below grade level were paired with students who were successful. The successful students shared the variety of ways that they used to check that they understood the material. For example, the successful students restated sections of the material in their own words, asked themselves questions about the material, and thought of examples that related to the information they were reading. The students identified as at risk of school failure first observed and then began to incorporate these strategies into their own studying. Comprehension test scores soared. These findings held when the performance changes were compared with a control group who spent the same amount of time with the material but did not receive any guidance in checking their own understanding from peers.

What Checking for Understanding Is Not

Checking for understanding is not the final exam or the state achievement tests. While there is evidence that checking for understanding will improve the scores students receive on these types of assessments, they are not what we mean by "checking for understanding." Final exams and state standards tests are summative exams. They are designed to provide feedback on how the student performed after instruction.

Checking for understanding is a systematic approach to formative assessment. Let's explore the difference between formative and summative assessment in greater detail. Figure 1.1 provides a comparison between the two assessment systems.

Figure 1.1. Comparison of Formative and Summative Assessments

Formative Assessments		Summative Assessments
To improve instruction and provide student feedback	Purpose	To measure student competency or mastery
Ongoing throughout unit	When administered	End of unit or course
To self-monitor understanding	How students use results	To gauge progress toward course- or grade-level goals and benchmarks

To check for understanding and provide additional instruction or intervention	How teachers use results	For grades, promotion
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Formative assessments are ongoing assessments, reviews, and observations in a classroom. Teachers use formative assessment to improve instructional methods and provide student feedback throughout the teaching and learning process. For example, if a teacher observes that some students do not grasp a concept, he or she can design a review activity to reinforce the concept or use a different instructional strategy to reteach it. (At the very least, teachers should check for understanding every 15 minutes; we have colleagues who check for understanding every couple of minutes.) Likewise, students can monitor their progress by looking at their results on periodic quizzes and performance tasks. The results of formative assessments are used to modify and validate instruction.

Summative assessments are typically used to evaluate the effectiveness of instructional programs and services at the end of an academic year or at a predetermined time. The goal of summative assessments is to judge student competency after an instructional phase is complete. Summative evaluations are used to determine if students have mastered specific competencies and to identify instructional areas that need additional attention.

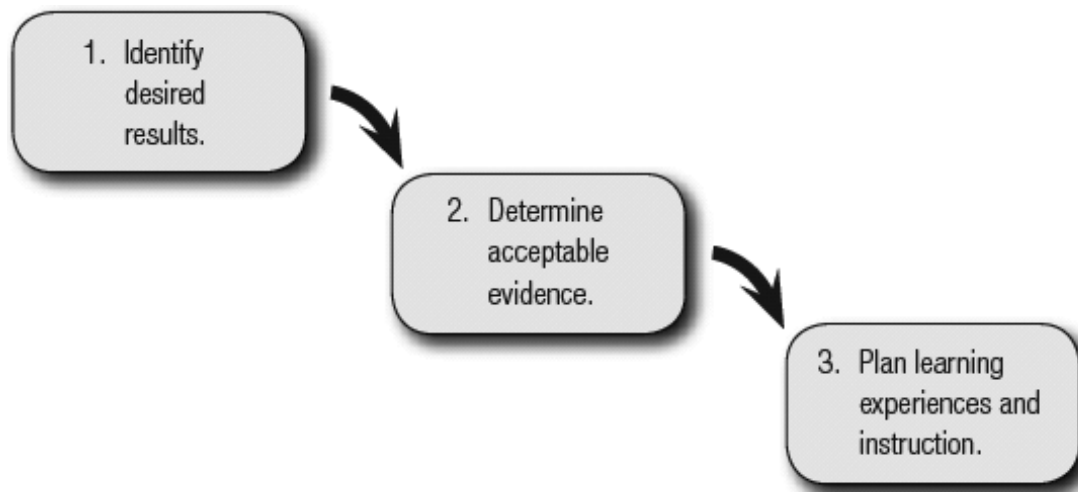
How Is Checking for Understanding Related to Other Teaching Initiatives?

There is no shortage of ideas for improving schools. An adaptation of a common saying hangs on our office wall that reads: "So many initiatives, so little time." This message reminds us on a daily basis that there is limited time to make progress; we have to pick and choose our initiatives wisely. Similarly, when our selected initiatives are conceptually linked, we know that we are more likely to implement them and see their widespread use. Let's consider how checking for understanding is related to some of the more common initiatives in education.

Understanding by Design

In 1998, Wiggins and McTighe proposed a curriculum model called Understanding by Design, in which curriculum and instruction are developed "backward." Teachers and curriculum developers learned to begin with the end in mind and plan accordingly. In other words, Wiggins and McTighe implored us to think about the outcomes, goals, and objectives we had for student learning first and then plan instruction and develop curriculum to close the gap between what students already know and what they need to know. A graphic representation of the stages in the backward curriculum design process can be found in Figure 1.2.

Figure 1.2. Stages in the Backward Design Process



Source: *Understanding by Design* (p. 18), by G. Wiggins and J. McTighe, 2005, ASCD. Used with permission.

A significant part of the Understanding by Design model centers on the use of assessments that focus on student understanding. As Wiggins and McTighe note, "Because understanding develops as a result of ongoing inquiry and rethinking, the assessment of understanding should be thought of in terms of a collection of evidence over time instead of an event—a single moment-in-time test at the end of instruction" (1988, p. 13).

Differentiating Instruction

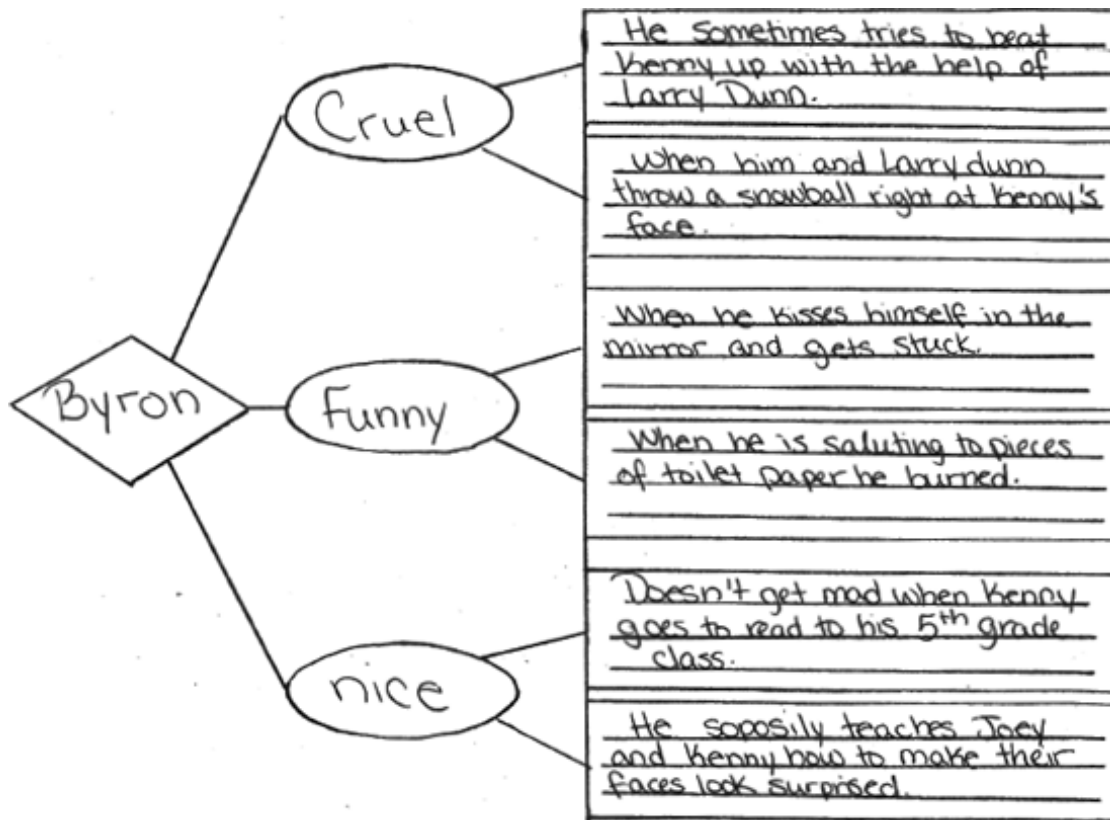
Carol Ann Tomlinson (1999) has challenged educators to differentiate instruction to meet the increasingly diverse needs of students. Teachers can differentiate the content, process, or products they use or expect from students. As noted in Tomlinson's model, assessment serves a critical role in teacher decision making. Teachers need to use a wide variety of assessment systems (and regularly check our students' understanding) to know whether or not our instructional interventions, modifications, accommodations, and extensions are working.

Checking for understanding presumes that students are able to demonstrate their understanding in different ways. This demands not only that products are differentiated but also that our ways of analyzing them are differentiated. Consider this example of a student's different responses to the same question.

Mariana, a 5th grader, was reluctant to speak in class. Mariana's teacher, Aida Allen, asked her to describe the character of Byron, the oldest brother in *The Watsons Go to Birmingham—1963* (Curtis, 1995). Byron is the kind of big brother who torments his younger siblings, sometimes making their lives miserable. However, his love for his brother and sister manifests itself in some surprising ways. Readers usually respond to Byron strongly, as his hurtful acts and flashes of kindness elevate him to the level of a realistic character. But in reply to Ms. Allen, Mariana merely mumbled, "Mean." Ms. Allen knew that Mariana had been enjoying the book and had overheard her talking to another member of her book club about it. A teacher who didn't understand checking for understanding might have cajoled Mariana for a minute or two and then moved on to another student who would supply a richer answer. But because she was interested in checking Mariana's understanding and not just filling the room with one student's answer, Ms. Allen later gave Mariana and a few other students character maps. "I'd like to know what you think about the main characters in this book and what evidence you have to support your opinions," she said. Mariana, uncomfortable with talking in class but engaged with the book, completed a character map of Byron in less than 10 minutes (see Figure 1.3). Her written response offered a far richer snapshot of her understanding than the monosyllabic answer

she had supplied earlier. Because she was persistent in differentiating product to check for understanding, Ms. Allen could see that Mariana understood far more than she had originally demonstrated.

Figure 1.3. Mariana's Character Map



Framework for Intentional and Targeted Teaching™

Instruction and assessment are not simply random events in a classroom. They are linked in profound ways. It's the intentional and targeted instruction that provides students with experiences that teachers can use to check for understanding. And it's this same intentional and targeted instruction that allows teachers to address the errors and misconceptions that they unearth as they check for understanding. Intentional and targeted instruction is based on the gradual release of responsibility framework (Fisher & Frey, 2013b; Pearson & Gallagher, 1983). The framework we have developed includes four recursive phases: focused instruction, collaborative learning, guided instruction, and independent learning. In each phase, teachers can check for understanding. Additionally, each phase can be used to address student's errors or misconceptions, depending on the type of error and the number of students who made the error.

Focused instruction. As we noted earlier in this chapter, the purpose for learning must be established in a clear and coherent manner with students. A clearly articulated purpose provides teachers with guidance about checking for understanding and allows students to share responsibility for learning. When the purpose is not clear, or not agreed upon, students may complete a number of tasks yet not be motivated to assume responsibility. They may fail to understand the relevance of the content. Students practically beg for an established purpose when they ask, "Why do we gotta know this stuff?"

In addition to establishing purpose, focused instruction involves teacher modeling. Simply stated, students deserve an example of thinking and language required of the task before being asked to engage independently. In addition, there is evidence that humans are hard-wired to mimic or imitate other humans,

which might explain why modeling is so effective. And further, there is evidence that scientists, historians, and mathematicians think differently and that this thinking is part of the discipline in which students need to be apprenticed (Shanahan & Shanahan, 2008).

Modeling requires that teachers provide an example of what happens in their minds as they solve problems, read, write, or complete tasks. Modeling is not an explanation or a time to question students, but rather an opportunity to demonstrate the ways in which experts think. Examples of modeling include:

While reading a science text, Mr. Bonine stopped at the word "carnivore" and modeled his thinking about the Spanish word *carne*, which he said helped him remember that carnivores were the meat eaters.

While thinking aloud about a text, Ms. Allen noted that the author introduced a problem. She said to her students, "Now here's a problem. I can predict that the solution to the problem will come next. That's how authors like to write, with a problem followed by a solution. I can take some notes using a problem and solution chart. Looking at the chart, I remember that in many cases, the solution to one problem creates new, often unexpected, problems. I wonder if that will be the case here."

While looking at a table, Ms. Burow noted the column and row headings and how to find information accordingly and modeled the use of a legend to find information.

Each of these examples ensured that students got a glimpse inside their teachers' thinking and provided the teacher with fodder for checking for understanding. Mr. Bonine, for example, checked his students' ability to use context clues and word parts to solve unknown words, whereas Ms. Burow asked students to identify information from a chart using a legend.

Collaborative Learning. Regardless of the subject matter or content area, students learn more, and retain information longer, when they work collaboratively. Students who work in collaborative groups also appear more satisfied with their classes, complete more assignments, and generally like school better (Summers, 2006). Groups need time to interact, timelines, agreed-upon roles, and interdependent tasks to complete. In other words, collaborative learning tasks are not those that could have been accomplished by an individual. They need to be tasks that require interaction and the natural give-and-take of learning.

But the key to collaborative groups lies in accountability: each student must be accountable for some aspect of the collaborative learning task. Unfortunately, that's not always the case. We can all remember group work in which one student did all of the work and everyone else got credit. Not only does that prevent some students from learning, but the lack of accountability thwarts teachers' attempts to check for understanding and link instruction with formative assessment.

In her geometry class, Ms. Chen has students complete a collaborative poster for each proof they solve. Each student must contribute to the poster, and she knows if they contribute by the color of marker they use. Each student in the group of four has an assigned color, and students must sign their name to each poster. In addition to this collaborative task, the group must ensure that each of its members can explain the proof independently. This requires a significant amount of reteaching, negotiation, support, and trust. In other words, students are assuming responsibility for their learning and the learning of their peers.

Guided instruction. While purpose, modeling, and collaborative tasks are important aspects of learning, students also require guided instruction to be successful. We define guided instruction as the strategic use of questions, prompts, or cues designed to facilitate student thinking. Guided instruction should be based on assessment information. While guided instruction can be done with the whole class, our experience suggests that it is most effective with small groups. While students are engaged in collaborative tasks, the teacher can meet with a small group for guided instruction. Members of the group should be selected based on the data collected during checking for understanding. In her discussion with a group of students who

misunderstood photosynthesis, Ms. Grant was able to use a series of questions and prompts to increase understanding.

Ms. Grant: Some of you thought that plants ate soil to grow. This is a very common misconception that we should talk about further. Do you remember the video we saw about photosynthesis? What role did soil play in that video?

Destini: Well, it wasn't about the dirt. It was about the sun and carbon dioxide.

Andrew: And how the plants make oxygen for humans.

Ms. Grant: Plants make oxygen for humans?

Andrew: Yeah. Well, I guess that they'd make oxygen even if there weren't humans.

Michael: It's called a by-product. They don't make oxygen for humans. They just make oxygen.

Ms. Grant: And what is left, once they've made this oxygen?

Destini: Carbon. They take in carbon dioxide and then give off oxygen, so carbon is left.

Ms. Grant: And what do you know about carbon?

Guided instruction provides teachers an opportunity to engage students in thinking, without telling them what to think. It's also an opportunity to scaffold their understanding before they're asked to complete tasks independently.

Independent learning. Independent learning, such as the application of information to a new situation, is the goal of schooling. Unfortunately, even a cursory look inside a typical classroom reveals that students are often asked to assume full responsibility for learning prematurely in the instructional cycle. Newly (or barely) learned tasks do not make for good independent learning. These require the clearly established purposes, teacher modeling, collaborative learning, and guided instruction found in sound classroom instruction. Instead, independent work should be reserved for review and reinforcement of previously taught concepts and applications. This phase of the instructional framework is ideal for the spiral review that so many educators know their students need but rarely get to implement. For example, an independent learning task to review the phases of the moon taught earlier in the school year should coincide with the new learning on the movement of planets around the sun. Thus, the independent learning task not only provides reinforcement of the phases, but also deepens their understanding of the patterns of movement in the sky and the ways they influence one another. In doing so, teachers can check for understanding of both current content and previously taught concepts.

Tips for Success

Checking for understanding completes the circle of assessment, planning, and instruction by providing teachers and students with evidence of learning. In addition, it is consistent with several other educational innovations, including Understanding by Design and differentiated instruction. Use these guiding questions to incorporate checking for understanding in your practice:

Do I know what misconceptions or naïve assumptions my students possess?

How do I know what they understand?

What evidence will I accept for this understanding?

How will I use their understandings to plan future instruction?

Teachers should plan intentional and targeted instruction, check for understanding, and then take action based on what the data says. Unfortunately, as Schmoker (2006) notes, "an enormous proportion of daily lessons are simply never assessed—formally or informally. For the majority of lessons, no evidence exists by which a teacher could gauge or report on how well students are learning essential standards" (p. 16). Some tips to consider when integrating checking for understanding into your instructional plans include the following:

Begin with the outcomes in mind. Know what you want your students to know and be able to do, and let them in on that secret.

Create engaging lessons—focused instruction, collaborative learning, guided instruction, and independent learning—aligned with those outcomes.

Plan to check for understanding, using a wide range of tools and strategies, on a regular basis.

Take action based on the data that you collect. In other words, examine student responses to figure out what they know and what they still need to learn. And then plan additional instruction using some combination of focused instruction, collaborative learning, guided instruction, and independent learning to lead students to greater and greater success.

KEYWORDS

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